Complete Summary

GUIDELINE TITLE

Management of asthma.

BIBLIOGRAPHIC SOURCE(S)

Singapore Ministry of Health. Management of asthma. Singapore: Singapore Ministry of Health; 2008 Jan. 80 p. [99 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Singapore Ministry of Health. Management of asthma. Singapore: Singapore Ministry of Health; 2002 Jan. 58 p.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Asthma

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Treatment

CLINICAL SPECIALTY

Family Practice
Internal Medicine
Pediatrics

INTENDED USERS

Allied Health Personnel
Nurses
Physicians
Respiratory Care Practitioners

GUIDELINE OBJECTIVE(S)

To present evidence-based clinical practice guidelines on practical aspects of asthma management relevant to Singapore

TARGET POPULATION

Patients with asthma in Singapore, including adults, children, and pregnant women

INTERVENTIONS AND PRACTICES CONSIDERED

1. Patient education
2. Avoidance of smoking
3. Environmental allergen avoidance
4. Pharmacological management (stepped care approach based on severity of asthma)
    - Inhaled corticosteroids
    - Long-acting inhaled beta-2-agonists
    - Rapid-acting inhaled beta-2-agonists
    - Short-term "burst" oral steroids, such as prednisolone
    - Methylxanthines, such as sustained-release theophylline
    - Leukotriene modifiers
    - Ipratropium bromide as adjuvant to beta-agonist
    - Use of aerosol holding chambers (spacer devices) with metered dose inhalers (MDIs), especially in children
5. Assessment of asthma control using the Asthma Control Test
6. Management of acute exacerbations
7. Management of asthma in pregnancy
8. Management of asthma in children
9. Written asthma action plan
10. Referral to specialists
11. Hospital admission

MAJOR OUTCOMES CONSIDERED

- Morbidity and mortality due to asthma
- Quality of life
- Asthma symptoms (e.g., wheezing, dyspnea, cough)
- Peak expiratory flow (PEF)

- Hospital admission
- Emergency room visits or physician visits
- Days off from work

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

Level 1^{++}: High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias.

Level 1^{+}: Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias.

Level 1^{-}: Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias.

Level 2^{++}: High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal.

Level 2^{+}: Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal.

Level 2^{-}: Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.

Level 3: Non-analytic studies, e.g., case reports, case series.

Level 4: Expert opinion.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

These guidelines have been produced by a committee comprising respiratory physicians, family physicians, paediatricians, and an asthma nurse appointed by the Ministry of Health. A patient with asthma assisted the committee in the patient version of the guideline. They were developed using the best available current evidence and expert opinion. This guideline is meant to be simple, and has very practical steps and evidenced-based recommendations for the family practice physician to follow.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grades of Recommendation

Grade A: At least one meta-analysis, systematic review of randomised controlled trials (RCTs), or RCT rated as 1^{++} and directly applicable to the target population; or a body of evidence consisting principally of studies rated as 1^{+}, directly applicable to the target population, and demonstrating overall consistency of results.

Grade B: A body of evidence including studies rated as 2^{++}, directly applicable to the target population, and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 1^{++} or 1^{+}.

Grade C: A body of evidence including studies rated as 2^{+}, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 2^{++}.

Grade D: Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2^{+}.

GPP (Good Practice Points): Recommended best practice based on the clinical experience of the guideline development group.

COST ANALYSIS

Cost-effectiveness studies are frequently utilised to calculate the incremental cost-effectiveness ratio (ICER) for additional symptom-free days or other outcome parameters of interest. These studies focus on direct medical expenses and occasionally, when recorded in the clinical study, may include indirect expenses from work or school days lost or reductions in health status.

A recent economic analysis was one of the first well-controlled clinical trials to show that inhaled corticosteroids provide clinical benefit at modest costs. The reviewed literature also demonstrates that the combination of an inhaled corticosteroid and a long acting beta-2-agonist are more efficacious from a clinical and cost-effective perspective when compared with the inhaled corticosteroids component alone, a higher dose of inhaled corticosteroids, or an alternative combination of controller medications. Further considerations for measuring long-term outcomes and dose-response relationships might be required to provide further evidence on the cost-effectiveness of combination therapy with inhaled corticosteroids plus long acting beta-2-agonists.

Cost-effectiveness studies are needed from a country-specific perspective. The economic disparities that may make an ICER acceptable in one country may be considered excessive in another country due to limited resources.

METHOD OF GUIDELINE VALIDATION

Not stated

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not applicable

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Each recommendation is rated based on the level of the evidence and the grades of recommendation. Definitions of the level of evidence (**1^{++}, 1^{+}, 1^{-}, 2^{++}, 2^{+}, 2^{-}, 3, 4)** and the grades of recommendations (**A, B, C, D and Good Practice Point [GPP]**) are defined at the end of the "Major Recommendations" field.

The following is a list of major revisions or additions to the revised guidelines:

1. The key change is that asthma management is now focused on achieving control of asthma, rather than on an accurate classification of disease severity into mild, moderate or severe persistent asthma, which was in the previous clinical practice guideline (CPG).
2. A new classification based on control of asthma is now provided: Controlled, Partly Controlled, or Uncontrolled. This is a working scheme of management based on current opinion.
3. The use of a validated, simple and robust tool, the Asthma Control Test (ACT), is recommended for the assessment of control at each clinic visit.
4. Treatment is stepped up or down depending on the level of control achieved. A new treatment algorithm, based on the ACT score, is provided.

5. Clinical quality indices for asthma have been revised.

Objectives of Asthma Management

GPP - A successful management plan should be established for each patient in the context of a team effort that includes: the patient, relevant family member or carer, doctor, nurse/clinic assistant and pharmacist. It should involve the following elements:

- Education-motivation
- Self assessment and management
- Environmental management
- Pharmacological management

D - A new classification of asthma, guided by the level of asthma control, is recommended. (See table below). (Global Initiative for Asthma, 2006) **Grade D, Level 4**

Table: Levels of Asthma Control

Characteristic	Controlled (All of the following)	Partly Controlled (Any measure present in any week)	Uncontrolled
Daytime symptoms	None (twice or less/week)	More than twice/week	Three or more features of partly controlled asthma present
Limitations of activities	None	Any	
Nocturnal symptoms/awakening	None	Any	
Need for reliever/rescue treatment	None (twice or less/week)	More than twice/week	
Lung function (PEFR or FEV1)*	Normal	<80% predicted or personal best (if known)	
Exacerbations	None	One or more/year**	One in any week***

* Lung function is not a reliable test for children 5 years and younger.

** Any exacerbation should prompt review of maintenance treatment to ensure that it is adequate.

*** By definition, an exacerbation in any week makes that an uncontrolled asthma week.

A - All doctors treating asthma patients should provide patient education to aid behavior change. (Refer to Tables 1 and 2 in the original guideline document for details). (Gibson et al., 2001) **Grade A, Level 1+**

A - House dust mite is a universal allergen. No single measure is effective to reduce exposure to mite allergens. An integrated approach including barrier methods, dust removal, environmental mite control may be partially effective and should be used. (Morgan et al., 2004) **Grade B, Level 2+**

GPP - During periods of haze, patients should be advised to avoid strenuous exertion outdoors. **GPP**

C - The possibility of occupational asthma should be considered in a working adult with newly diagnosed asthma. The range of occupational sensitizers is large, and complex. If occupational asthma is suspected, the patient should be referred to a specialist for further assessment. (Nicholson et al., 2005) **Grade C, Level 2+**

B - Smoking should be avoided in all patients with asthma especially pregnant women and children. (Martinez et al., 1995; Dezateux et al., 1999) **Grade B, Level 2+**

A - Asthma medications can be given by various routes. The best route is by inhalation, because the drugs are given directly where they are needed, into the airways. This leads to faster action, with a much reduced risk of systemic side effects. (Brown PH et al.) **Grade A, Level 1+**

A - Inhaled corticosteroids are best used at low to moderate doses (refer to Table 4 in the original guideline document for details). (Powel & Gibson, "Inhaled corticosteroid," 2003; Szefler et al., 2002) **Grade A, Level 1+**

A - Long acting beta-2-agonists, including salmeterol and formoterol, should never be used as monotherapy in asthma. (Lemanski et al., 2001; Lazarus et al., 2001) **Grade A, Level 1+**

A - The strategy of "add on therapy" with long acting beta-2-agonists is recommended when a low to medium-dose of inhaled corticosteroids alone fails to achieve control of asthma. (O' Byrne et al., 2005; Scicchitano et al., 2004; Rabe et al., 2006; Vogelmeier et al., 2005) **Grade A, Level 1++**

A - Formoterol is a long acting beta-2-agonist, which has a rapid onset of action comparable to that of a rapid acting beta-2-agonist drug. If a combination inhaler containing formoterol and budesonide is considered, it may be used for both rescue and maintenance. This has been shown to reduce exacerbations and improve asthma control in adults and adolescents at relatively low doses of treatment. (O' Byrne et al., 2005; Scicchitano et al., 2004; Rabe et al., 2006; Vogelmeier et al., 2005) **Grade A, Level 1++**

B - Theophylline has a bronchodilator action and also modest anti-inflammatory properties. It cannot however be used as a controller drug. It may be useful as an add-on drug in patients who do not achieve good control on inhaled glucocorticosteroids alone. (Dahl, Larsen, & Venge, 2002; Evans et al., 1997) **Grade B, Level 2++**

A - Leukotriene modifiers such as montelukast have a small and variable bronchodilator effect, reducing symptoms including cough, improving lung

function and reducing exacerbations and airway inflammation. It can either be used as an alternative to low dose inhaled glucocorticosteroids in patients with mild persistent asthma, or as an add-on drug when low dose inhaled glucocorticosteroids or when the combination of inhaled corticosteroids with long acting beta-2-agonist have not given the desired effect. (Laviolette et al., 1999; Lofdahl et al., 1999; Price et al., 2003; Vaquerizo et al., 2003) **Grade A, Level 1+**

A - The combination of inhaled ipratropium and inhaled beta-2-agonist may be used in the treatment of acute severe asthma exacerbation. **Grade A, Level 1+**

A - Short-term "burst" oral corticosteroids may be given at the dose of 40 to 50 mg/day for 5 to 10 days as treatment of severe acute exacerbation of asthma and in worsening asthma. **Grade A, Level 1+**

A - Regular low doses of oral steroids cause severe and intolerable long term side effects and should not be used in primary care. **Grade A, Level 1+**

A - The asthma clinical practice guidelines (CPG) workgroup recommends the **Asthma Control Test (ACT)**, a 5-item, patient-administered survey questionnaire for assessing asthma control (Figure 1 in the original guideline document for details). This is a simple, objective, robust and validated method for monitoring control by doctors (and patients). (Global Initiative for Asthma, 2006; Nathan et al., 2004) **Grade A, Level 1+**

GPP - Patients who do not achieve good asthma control despite Step 4 levels of treatment have refractory asthma and should be reviewed by a specialist. Thus, management at Step 5 should be supervised directly by specialists. **GPP**

Management of Acute Exacerbations

GPP - Mild attacks (defined as reduction in peak flow of less than 20%, nocturnal awakening and increased use of short acting beta-2-agonist) can be treated at home. Beginning treatment at home also avoids treatment delays, prevents exacerbations from becoming severe, and also adds to patients' sense of control over their asthma. **GPP**

Treatment of Acute Asthma at the Clinic

GPP - Patients at high risk of dying from asthma require special attention, monitoring and care, particularly intensive education, including advice to seek medical care early during an exacerbation. **GPP**

Management of Adult Acute Asthma in the Clinic

Initial Treatment

B - Continuous inhaled, short-acting beta-2-agonist by nebulisation, one dose (e.g., salbutamol 5 to 10 mg) every 20 minutes for one hour; alternatively, the use of an inhaler (e.g., 20 puffs of salbutamol) plus a holding chamber (spacer device) produces equally effective bronchodilation. **Grade B Level 2++**

A - Addition of ipratropium 0.5 mg in adults to an aerosolised solution of beta-2-agonist has been shown to cause additional bronchodilation, particularly in those with severe airflow obstruction, and to reduce hospitalisation. **Grade A Level 1++**

A - Systemic corticosteroids e.g., prednisolone 30 mg, immediately and repeated for 7 to 10 days for all patients. No "tail" is needed and oral steroids are as rapid and effective as injections. **Grade A Level 1+**

At the Clinic Visit

GPP - The use of the Levels of Asthma Control table (see table above) and checklist is recommended on all patients at every visit.

Checklist:

a. Good Inhaler Technique
b. Compliance with preventive treatment
c. Compliance with follow-up visits
d. Reinforce Written Asthma Action Plan

GPP - Written Asthma Action Plan should be taught so that patients can implement it for self-management of exacerbations between visits (refer to section 5.3 and Annex A in the original guideline document for details) Patients should be advised to perform monthly self-audit of ACT scores between visits. **GPP**

GPP - Device proficiency should be emphasized at the first and every consultation. Education should include verbal instruction and demonstration of proper use of the devices by the health care providers. Patient should be encouraged to demonstrate their proficiency in the inhaler devices usage at every clinic visit. **GPP**

A - Asthma patients should be provided with a symptom-based written asthma action plan. **Grade A, Level 1++**

B - Doctors should ensure regular review of their patients who are unable to undertake guided self-management and adjust their medications according to their asthma control. (Powell & Gibson, "Options," 2003) **Grade B, Level 2++**

GPP - Patients should be provided with an appointment for review at regular intervals, depending on their asthma control status. During these follow-ups, the following measures may be included in the consultation:

1. Assess asthma control based on symptom frequency (referring to diary/calendar), impact on activities of daily living and/or PEFR measurements. Healthcare workers can assess asthma control using composite assessment tool, such as validated questionnaires like the Asthma Control Test (ACT). (Nathan et al., 2004)
2. Clarify and discuss patient's questions and asthma related problems, including the initial or previous treatment. (Patridge & Hill, 2000)

3. Check and correct inhaler device technique, if inappropriate.
4. Check patient's adherence/compliance to the medication plan.
5. Suggest measures to reduce exposure to trigger or risk factors.
6. Assess understanding of written asthma action plan and revise according to asthma control status. (Reddel, 2007) **GPP**

B - Asthmatic patients who are pregnant should be managed with inhalation therapy, which is safe and effective in pregnancy. **Grade B, Level 2++**

GPP - Primary care physicians can treat most asthma patients but may consider referring the following subsets of patients to respiratory physicians for further evaluation and/or management: those with other co-morbidity, confusing signs and symptoms and whose control is sub-optimal despite treatment with maximal drug dosages (3Cs).

1. Co-morbidity:
    a. Patient with concurrent heart failure, which may complicate asthma management.
    b. Patient with a history of psychiatric disease or multiple psychosocial problems, including the use of sedative.
    c. Patient with concurrent gastroesophageal reflux disease (GERD) which may mimic asthma.

2. Confusing sign and symptoms
    a. Patient with probable occupational asthma will require further diagnostic determination of the industrial trigger agent.
    b. Patient with atypical signs and symptoms such as unilateral wheezing to exclude other tracheobronchial pathology.

3. Control: Failure to achieve asthma control despite optimal treatment
    a. Patient who is currently using or have recently stopped using daily oral corticosteroid therapy.
    b. Patient with a history of near-fatal asthma requiring intubation and mechanical ventilation.
    c. Patient with severe asthma requiring step 4 care and yet experiencing exacerbation despite compliance to treatment.
    d. Patient with poorly controlled asthma (irregardless of asthma severity classification) who had at least two hospitalizations for asthma and/or requires more than two courses of burst therapies with oral corticosteroid in the past one year.

Management of Asthma in Children

B - A detailed medical history and clinical examination is mandatory. Additional tests like Pulmonary Function Tests (PFT), exhaled nitric oxide may be useful to support the diagnosis made or to monitor response to therapy for the more difficult patients. (Brindicci et al, 2007; Roberts et al., 2004) **Grade B, Level 2+**

A - Rapid-acting inhaled beta-2-agonists are the medications of choice for relief of bronchoconstriction and for the pre-treatment of exercise induced asthma. Beta-2-agonist metered-dose-inhaler (MDI) delivered by the holding chamber/spacer has been shown to be at least as effective as the nebuliser. Hence routine use of

nebulisers is not recommended. During asthma exacerbations, as many as 4 to 8 puffs of salbutamol inhaler or 0.2 to 0.3 puffs/kg (max 10 puffs) may be used. (Cates et al. 2007; Schuh et al., 1999) **Grade A, Level 1++**

A - Long acting inhaled beta-2-agonists may be used as add-on therapy for children with symptoms which are not controlled with low dose inhaled steroids. These should not be used without concomitant inhaled corticosteroids. (Bisgaard et al., 2006) **Grade A, Level 1+**

A - Only formoterol may be used as a reliever medicine in view of its rapid onset of action. (O'Byrne, et al., 2005; Cabral et al., 2001; Hermansen et al., 2006) **Grade A, Level 1+**

A - Inhaled bronchodilators are preferred as they have quicker onset of action and fewer side effects than oral or IV administration. (Williams, Winner, & Clark, 1981) **Grade A, Level 2+**

B - For the younger children with nocturnal symptoms, oral long acting beta-2-agonists may be useful (Zarkovic et al., 2000). Sustained release theophylline can be useful for a short duration. It is important to monitor for side effects such as agitation, muscle tremors, palpitations and headache. (Ellis, 1985; Bender et al., 1991; Rachelefszky et al., 1986; Schlieper et al., 1991) **Grade B, Level 2+**

A - In older children above 5 years, leukotriene modifiers may be used as they provide clinical benefit at all levels of asthma severity. However, clinical benefits are generally less than those with inhaled corticosteroids. (Garcia et al., 2005; Ng, Salvio, & Hicks 2004; Ducharme & Di Salvio, 2007) **Grade A, Level 1++**

A - Leukotriene modifiers may be used to reduce viral induced asthma exacerbation in younger children aged 2 to 5 years. (Bisgaard, et al., 2005) **Grade A, Level 1+**

A - Leukotriene modifiers may be used as an add-on therapy in children on low to moderate doses of inhaled steroids. In children with poor asthma control, adding a leukotriene modifier may provide additional benefit, including reducing the number of exacerbations. (Phipatanakul et al., 2003) **Grade A, Level 1+**

A - A long acting beta-agonist or a leukotriene modifier should be added rather than increasing the dose of inhaled steroids if children with mild persistent asthma do not show clinical improvement with inhaled steroids alone. (Nelson et al., 2000; Fish et al., 2001; Bestall & Jones, 2007) **Grade A, Level 1+**

A - Combination agents containing long acting inhaled beta-2-agonists and inhaled steroids may be used in children above 5 years of age whose control is not optimum with low dose inhaled steroids. (Bisgaard et al., 2006; Noonan et al., 2006) **Grade A, Level 1+**

GPP - Recommended in choosing an inhaler device for children:

<4 years: MDI with spacer + a facemask

4-6 years: MDI with spacer with mouthpiece

>6 years: MDI with spacer with mouthpiece or dry powder inhaler, e.g., accuhaler and turbuhaler

GPP - Follow-up assessment is best achieved with a review of peak expiratory flow rate (PEFR) and symptom control. It is important to check for compliance, inhaler technique and correct use of a spacer device at each visit. The treatment should be kept as simple as possible, preferably once or twice a day dosing. For older children, new inhaler devices, e.g., turbuhalers, and other breath-activated devices may enhanced drug delivery and encourage compliance. **GPP**

GPP - Anti-inflammatory therapy ought to be maintained for at least 3 months after adequate control of symptoms. The child should be reviewed regularly thereafter with the view to reducing therapy to the minimum amount to maintain control of asthma. Should symptoms relapse during the tapering of maintenance doses, step-up of dosage may be necessary to achieve good control (after ensuring good compliance and inhaler technique). **GPP**

A - The initiation of long-term control therapy is recommended for reducing impairment and risk of exacerbations in infants and young children who had four or more episodes of wheezing in the past year that lasted more than 1 day and affected sleep AND who have either:

1. One of the following: a parental history of asthma, a physician's diagnosis of atopic dermatitis, or evidence of sensitization to aeroallergens

   OR

2. Two of the following: evidence of Immunoglobulin E (IgE) sensitization to foods, ≥4 percent peripheral blood eosinophilia, or wheezing apart from colds. (Castro-Rodriguez et al., 2000) **Grade A, Level 1+**

A - Inhaled corticosteroids should be used to control symptoms, prevent exacerbations, and improve the child's quality of life, but their use should not be initiated or prolonged for the purpose of changing the progression or underlying severity of the disease. **Grade A, Level 1+**

GPP - The asthmatic child should be referred to a specialist for evaluation and management advice when he or she:

a. Has high risk asthma with poor asthma control

   OR

b. Is below 3 years and requires moderate to high doses of inhaled steroids and not responding as expected

   OR

c. Requires high dose steroids, BDP/BUD $\geq$400 mcg/day or fluticasone $\geq$200 mcg/day, or is on prolonged inhaled steroid therapy for more than 6 months and remains symptomatic. **GPP**

GPP - When an acute exacerbation is expected, e.g. during an acute upper respiratory infection, the usual medications should be stepped up:

a. Frequent beta-2-agonist (e.g., salbutamol MDI 0.2 to 0.3 puffs/kg), should be given at 4 hourly intervals, preferably via a spacer device.
b. For selected patients who have severe asthma or with a past history of acute sudden severe attacks, the action plan should include the need to increase the dose of inhaled steroids and rarely to start a course of oral prednisolone.

A - It is strongly recommended that clear written asthma action plans be given to the family on how to manage acute exacerbations based on symptoms. (Toelle & Ram, 2007) **Grade A, Level 1+**

GPP - It is recommended that symptom assessment and objective measurement of severity with PEFR be used in assessment of acute asthma whenever possible. **GPP**

A - An inhaled bronchodilator should be given at 15 to 20 minute intervals and the child reviewed thereafter. **Grade A, Level 1+**

GPP - Admission for a child should be considered with any of the following:

a. Shows no or poor response to a beta-2-agonist
b. Requires an inhaled beta-2-agonist more frequently than 4 hourly
c. Has acute asthma and has a past history of acute life threatening asthma **GPP**

GPP - A short course of steroids should be considered when the child meets one of the following criteria:

a. Requires frequent beta-2-agonist therapy (more frequent than 3 hourly)
b. Requires regular nebuliser therapy (3 to 4 hourly) for more than 36 to 48 hours
c. Has a past history of a severe life threatening episode
d. Is on high dose inhaled steroids or low dose oral steroids **GPP**

D & GPP - A dose of prednisolone of 1 to 2 mg/kg per day (max 40 mg) is usually given for no longer than 5 days. (Global Initiative for Asthma, 2006; Bacharier et al., 2008) A child who has suffered from a severe acute attack and requires prolonged or repeated oral steroids for control should be referred to a specialist for assessment of treatment. **Grade D, Level 4, GPP**

Definitions:

Levels of Evidence

Level 1^{++}

High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias.

Level 1^{+}

Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias.

Level 1^{-}

Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias.

Level 2^{++}

High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal.

Level 2^{+}

Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal.

Level 2^{-}

Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.

Level 3

Non-analytic studies, e.g., case reports, case series.

Level 4

Expert opinion

Grades of Recommendation

Grade A: At least one meta-analysis, systematic review of RCTs, or RCT rated as $1^{+\,+}$ and directly applicable to the target population; *or*

A body of evidence consisting principally of studies rated as 1^{+}, directly applicable to the target population, and demonstrating overall consistency of results.

Grade B: A body of evidence including studies rated as 2^{++}, directly applicable to the target population, and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as $1^{+\,+}$ or 1^{+}

Grade C: A body of evidence including studies rated as 2^{+}, directly applicable to the target population and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as $2^{+\,+}$

Grade D: Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2^{+}

GPP (Good Practice Points): Recommended best practice based on the clinical experience of the guideline development group.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Benefits of Asthma Management Plan

- Long-term control of asthma symptoms
- Preventing asthma exacerbations
- Maintaining normal activity, including exercise and work/school/vacations
- Avoiding side effects of asthma drugs (including excessive cost)
- Preventing asthma death
- Maintaining normal pulmonary function (optional)

Benefits of Long-term Preventive Treatment of Asthma

- Improved quality of life
- Reduced frequency and severity of asthma exacerbations
- Reduced risk of emergency room visits
- Reduced risk of hospital admissions
- Preventing loss of productivity from days missed work/school
- Reduced total cost of asthma treatment in the longer term
- Reduced risk of death from asthma

Other Benefits

Encourage patient independence and confidence in managing mild acute attacks.

POTENTIAL HARMS

Adverse Effects of Inhaled Steroids

- Side effects of inhaled corticosteroids include oropharyngeal candidiasis, dysphonia and cough. At higher doses, there may be easy bruising, biochemical adrenal suppression and decreased bone mineral density.
- Growth retardation may be seen with all inhaled glucocorticosteroids, especially when high doses are administered.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- These guidelines are not intended to serve as a standard of medical care. Standards of medical care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge advances and patterns of care evolve.
- The contents of this publication are guidelines to clinical practice, based on the best available evidence at the time of development. Adherence to these guidelines may not ensure a successful outcome in every case. These guidelines should not be construed as including all proper methods of care, nor exclude other acceptable methods of care. Each physician is ultimately responsible for the management of his/her unique patient in the light of the clinical data presented by the patient and the diagnostic and treatment options available.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

The workgroup proposes some possible clinical quality indicators, based on recommendations in this guideline, that healthcare providers may use in monitoring their practice and to better gauge their quality of care. (See Section 8, "Clinical Quality Improvement," in the original guideline document.)

Indices of Poor Clinical Outcome Which Require Monitoring

1. Excessive use of inhaled quick relief agents $\geq$2 units per month
2. Severe acute exacerbations requiring nebulisation $\geq$2 per year
3. Status asthmaticus: failure to improve after treatment with beta-agonists
4. Short bursts of oral steroids $\geq$2 per year
5. No patient should be on long term oral corticosteroids in primary care
6. Hospital admission or readmission for asthma

IMPLEMENTATION TOOLS

Audit Criteria/Indicators
Chart Documentation/Checklists/Forms
Personal Digital Assistant (PDA) Downloads
Quick Reference Guides/Physician Guides
Staff Training/Competency Material

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Singapore Ministry of Health. Management of asthma. Singapore: Singapore Ministry of Health; 2008 Jan. 80 p. [99 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2002 Jan (revised 2008 Jan)

GUIDELINE DEVELOPER(S)

National Medical Research Council (Singapore Ministry of Health) - National Government Agency [Non-U.S.]
Singapore Ministry of Health - National Government Agency [Non-U.S.]

SOURCE(S) OF FUNDING

Singapore Ministry of Health

GUIDELINE COMMITTEE

Workgroup on Management of Asthma

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

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GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the Singapore Ministry of Health Web site.

Print copies: Available from the Singapore Ministry of Health, College of Medicine Building, Mezzanine Floor, 16 College Rd, Singapore 169854.

AVAILABILITY OF COMPANION DOCUMENTS

The full text guideline and summary card are available for PDA download in ISilo and MSReader formats from the Singapore Ministry of Health Web site.

PATIENT RESOURCES

None available

NGC STATUS

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